

SeaSoar data series for cruise Pelagia PE125

Principal Investigator

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Content of data series

Parameter	Unit	Parameter code	Number of profiles	Comments
Latitude	deg. N	ALATGP01	-	none
Longitude	deg. E	ALONGP01	-	none
Pressure	db	PRESPR01	1450	none
Salinity	PSU-78	PSALST01	1441	none
Temperature (ITS-90)	deg. C	TEMPST01	1442	none
Chlorophyll a	$\mu\text{g l}^{-1}$	CPHLPR01	1450	calibrated from fluorescence
Potential temperature	deg. C	POTMCV01	1440	none
Sigma-theta	kg m^{-3}	SIGTPR01	1440	none

Sampling strategy

The deployment took place during the cruise Pelagia PE125, in the vicinity of PROVCESS main mooring site in the northern North Sea and consisted of three box surveys:

- Survey 1 (SS1) from 21/10/1998 18:57 to 22/10/1998 07:57 (12 hrs) extended between 59.308 and 59.583 deg. N and between 0.500 and 1.432 deg. E.
- Survey 2 (SS2) from 23/10/1998 19:53 to 24/10/1998 07:48 (12 hrs) extended between 59.083 and 59.308 deg. N, and between 0.666 and 1.332 deg. E.
- Survey 3 (SS3) from 27/10/1998 13:35 to 28/10/1998 07:04 (16 hrs) extended between 59.155 and 59.499 deg. N, and between 0.667 and 1.334 deg. E. This last survey also included a diagonal section within the box.

Most of the time the SeaSoar was on 200 metres of tow cable giving a depth range of approx. 80 metres. Surveys were carried out at an average speed of 6 to 8 knots.

Instrumentation and RVS processing (Martin Beney, RVS)

Instrumentation:

The SeaSoar was equipped with a Neil Brown MkIII CTD fitted with a Chelsea Instrument MkIII fluorometer. Although an oxygen sensor was also fitted on the SeaSoar, the data were not included in the final data series because no oxygen calibration samples were taken during the cruise.

Bottle water samples were collected for salinity (Dave Teare, RVS) and chlorophyll (Karen Wild-Allen, Napier University) analyses. The samples were drawn from the ship Aqua-flow system at the beginning and end of survey and at approx. 4 hours interval during each survey when the SeaSoar was at approx. 4 metres depth (also the depth of the Aqua-flow intake). These samples were used for correction of any SeaSoar salinity offset and for the calibration of the SeaSoar fluorometer (see below).

Data acquisition and on board processing:

The data were logged by a Research Vessel Services Level 'A' microcomputer that dynamically reduced the sampling frequency to 1Hz and applied a time stamp from the PC internal clock. A technical failure prevented to process the data further during the cruise. As a result, the reduced data were logged on the Level 'C' (a Sun workstation) at the Southampton Oceanographic Centre after the cruise. Initial calibrations were applied to convert the raw counts into engineering units. The times associated

with the SeaSoar data were then corrected by taking into account the start time for recording as logged to the PC file and the offset of the PC internal clock to the ship's master clock logged on the ABC system. The time error associated with this correction is not in excess of 20 seconds.

BODC data processing

Calibrations:

- Pressure: the accuracy of the pressure channel was examined by considering the pressure values when the seaoar was logging in the air (as indicated by salinity values < 1 PSU). Pressure readings in air (888 datapoints for Survey 1, 478 for Survey 2 and 1806 for Survey 3) were sufficiently close to zero (ranging from -0.09 to +0.39 db) and no correction was applied to the pressure channel.
- Salinity was calibrated using water samples collected from the ship's non-toxic seawater supply when the SeaSoar was close to the surface. The samples were analysed on a Guildline Autosol bench salinometer calibrated against OSI standard seawater. A significant offset was observed for the three surveys and the following corrections were applied to the data:

Survey 1: calibrated salinity = SeaSoar Salinity + 0.043 PSU (SD= ±0.016, n=5)

Survey 2: calibrated salinity = SeaSoar Salinity + 0.043 PSU (SD= ±0.012, n=4)

Survey 3: calibrated salinity = SeaSoar Salinity + 0.014 PSU (SD= ±0.002, n=3)

The calibrated SeaSoar data from the depth range of 3-6 decibars were then compared with corresponding calibrated salinity data from the surface underway thermosalinograph record in order to check for instrument drift. No significant drift was detected for any of the three surveys.

- Temperature was checked by comparing SeaSoar data from the depth range 3-6 decibars with corresponding calibrated temperature data from the surface underway thermosalinograph record. The difference between the two data sets was not significant and consequently the SeaSoar temperature data were left unchanged.
- Fluorescence: for the calibration of the SeaSoar fluorescence channel, variations in surface distribution were too small to derive a significant calibration equation from surface data only. Extracted chlorophyll values from samples taken from the non-toxic supply during the SeaSoar surveys were therefore combined with extracted chlorophyll measured on samples taken at different depths during the CTD stations just prior to and after each survey. These were compared with SeaSoar fluorometer voltages from the first two profiles of each SeaSoar survey averaged within ±1 db of the sampling depth. The resulting calibration equation applied to the data was as follows:

$$\text{Chl } (\mu\text{g l}^{-1}) = \exp(3.66 \text{ Voltages} - 4.99), \quad R^2 = 0.93, \quad n=22$$

Screening:

- Navigation was added to the calibrated SeaSoar data by matching the time channels from the SeaSoar data and the ABC navigation file.
- The calibrated data were then screened using the BODC SERPLO interactive graphical editor. All suspect data were flagged by setting the quality control byte to 'M'.
- The limits of the individual profiles were marked by setting the pressure channel flag to 'B' and 'E' to signify 'beginning' and 'end' respectively.
- The data series were 'topped and tailed' to eliminate corrupt data collected during deployment and recovery of the fish.

Format of the data:

The data are available in two formats:

- as pseudo-profiles, extracted between the limits set during the screening of the SeaSoar time-series and binned to 1 db. These data were loaded into a database under the ORACLE Relational Database Management System. On the CD-ROM, they may be accessed in the same way as conventional CTD data from the PROVESS database.
- as a 1 Hz time-series in ASCII format files (one file per survey) available from Disk 2 (directory SEASOAR) of the PROVESS CD-ROM set.

Comments on data quality

Data from all channels were good and the SeaSoar was flying well most of the time. Only one problem was noted on 21 October between 21:00 and 21:30 when bad temperature and salinity records were observed for 4 full oscillations. These data were flagged as suspect in the time-series file.

Salinity was the noisiest channel and a number of large spikes were observed on reaching the thermocline. These spikes were flagged as suspect in the time-series. A number of small but significant drops in salinity were also observed and flagged on several occasions (note that the binning software used prior to loading the profiles in the database would have ignored the flagged values when averaging the data).